

SAMPLING CONCRETE, CASTING SPECIMENS,
AND CURING SPECIMENS FOR TESTING CONCRETE

GENERAL:

"Sampling" is the procedure for obtaining fresh concrete, as delivered to the project site, on which tests are to be performed to determine compliance with quality requirements of the specifications.

"Casting" is the procedure for making test specimens from concrete being used in construction. Each specimen will be cylindrical in shape, 6 inches in diameter by 12 inches long. Three specimens comprise one compressive strength test.

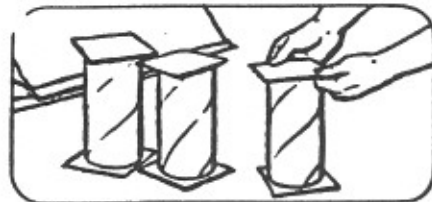
"Curing" describes the care given cast specimens from the time of casting to the time of strength testing. This consists of controlling moisture and temperatures conditions.

Each specimen must be identified throughout the casting, curing and testing process. The identification must include the job name and location, as well as the specimen number or letter.

Equipment Needed:

Bucket	Molds for specimen casting
Sugar scoop or shovel	Rubber bands
Wood float	Small tank or tub
Maximum and minimum thermometers	Marking pen
5/8" x 24" tamping rod (with rounded end)	Cylinder socks or plastic bags

Remember, the concrete producer has no control over what happens to his product after it leaves the end of the concrete chute. In a sense, his reputation is in the hands of people over whom he has no control, the people who make the test specimens.



SAMPLING FRESH CONCRETE (ASTM C-172)

Concrete samples shall be taken from the middle of the batch from stationary mixers or revolving drum truck mixers. NEVER SAMPLE CONCRETE FROM THE FORMS. Obtain a sample by repeatedly passing a container through the entire discharge stream or by completely diverting the discharge into a sample container. A sample shall be no less than 1 cu. ft. If two or more samples are required they shall be taken within a 15 minute time span. Immediately transport sample to the place where they will be made into specimens. The samples shall be combined and mixed with a shovel a minimum amount to ensure uniformity. Protect the sample(s) from sun and wind.

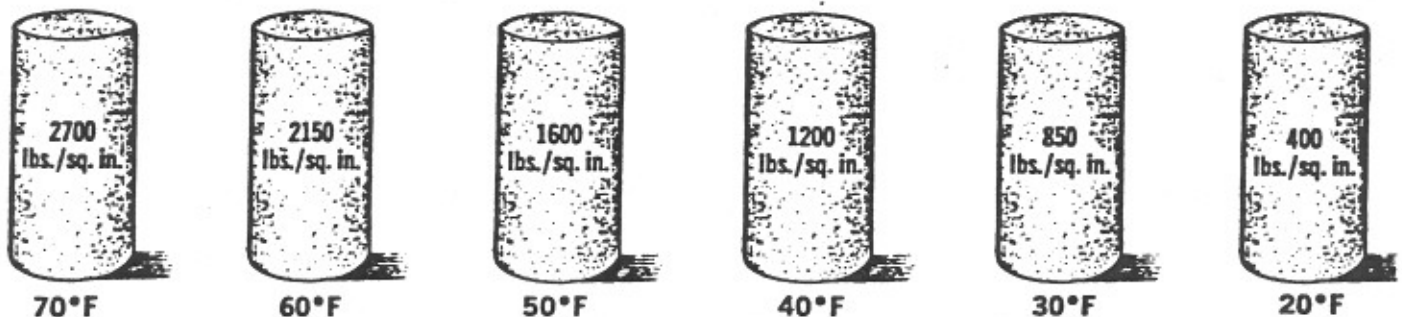
CASTING SPECIMENS (ASTM C-31)

Specimens shall be cylindrical in shape 6 in. diam. by 12 in. long. No tests will be made using less than 3 specimens. Specimen containers may be metal, plastic, or waterproof cardboard, but in any case, they shall be watertight. Re-useable molds shall be made watertight by caulking the seams with heavy grease, modeling clay or other suitable sealants. Disposable waterproof cardboard molds are normally furnished by testing laboratories.

Cast specimens on a level, rigid, horizontal surface, free from vibrations and other disturbances, at a place as near as practicable to the location where they are to be stored during the first 24 hours. If necessary, move the sample prior to casting, not the specimen. Since specimens should not be moved for 24 hours after casting, they must be cast in a location where temperature can be controlled.

Place concrete in molds in 3 lifts of approximately even volume and rod each lift 25 strokes. Care should be taken in rodding not to dent or jar the bottom of mold or penetrate the previous lift more than $\frac{1}{2}$ inch. Strike off the surface of the 3rd lift on top of mold with tamping rod or wooden float and immediately cap with a plastic cylinder sock (usually available from cement plants), plastic bag, or similar cap, to prevent loss of moisture. Do not overfill more than $\frac{1}{4}$ inch and do not add non-representative concrete to underfilled molds. Casting of specimens must be completed within $1\frac{1}{2}$ hours of the initial charging of water into the mixer.

How Concrete Temperature Controls Strength



TEMPERATURE MAKES THE DIFFERENCE. All specimens shown above were made from the same concrete, same slump and taken from the same job. Each was exposed for three days at the temperature shown. The strengths shown are results of 3-day tests.

CURING

During the first 24 hours after casting, store all test specimens under conditions that maintain the temperature immediately adjacent to the specimens in the range of 60° to 80° F. Specimens shall be stored in firmly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, heavyweight plastic bags, etc. Storage temperatures shall be regulated by means of ventilation, or by evaporation of water from sand or burlap or by using heat devices such as stoves, electric light bulbs or controlled heating cables. A temperature record for the area where the specimens are to be stored shall be established by the use of a maximum-minimum thermometer from 24 hours prior to placing the concrete until specimens are delivered to the testing laboratory.

Where cardboard cylinders are used, care should be used so that they do not come in contact with wet sand, wet burlap, etc., during the first 24 hours of the curing period.

After 20 hours (+ 4 hours) specimens may be transported with extreme care to prevent damage by bumping, jarring, rolling, etc., to a place where temperature will be controlled between 70° and 77° F. At this time specimens shall be removed from casting containers and submerged completely in saturated lime water at a temperature between 70° and 77° F. Specimens shall not be exposed to dripping or running water. Specimens shall remain in the saturated lime water bath until removed for transportation to the testing laboratory.

Specimens should be removed from lime water, re-packaged in cardboard boxes and/or wet newspapers, or wet sand, and delivered to the testing laboratory at least 24 hours before a strength test is to be made, to allow placement in the "fog" room prior to breaking for strength testing.

Care must be used during transporting the concrete specimens to protect them from sun and wind, as well as rolling, jarring, bumping, etc. If, during the curing period, concrete is allowed to dry, the chemical change stops, leaving the concrete in an immature state, and when tested, will not show the true strength of the concrete batch.